

AMENDMENTS TO THE CLAIMS

This listing will replace all prior versions, and listings, of claims, in the application:

Listing of Claims:

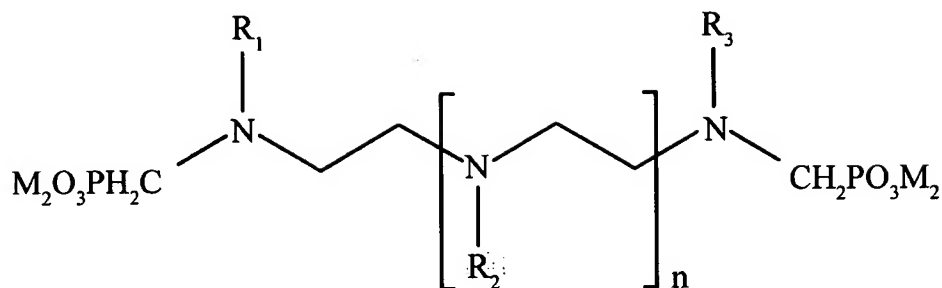
What is claimed is:

Claim 1. (canceled)

- Claim 2 (currently amended) Polyaminomethylenephosphonate derivatives
according to the preceding claim wherein n is preferably between 2 and 15000, and each R
group, being the same or different, is independently selected from the following classes:
1. $\text{CH}_2\text{PO}_3\text{M}_2$ ——— where M may be hydrogen or a suitable cation such as alkali metal or ammonium;
 2. CH_2R ——— con $\text{R} = \text{CH}_2\text{OH}; \text{CHOHCH}_3; \text{CHOHCH}_2\text{Cl}; \text{CHOHCH}_2\text{OH}$
 3. $(\text{CH}_2)_n\text{SO}_3\text{M}$ ——— con $n = 3-4$ where M may be hydrogen or a suitable cation such as alkali metal or ammonium;
 4. $\text{CH}_2\text{CH}_2\text{R}$ ——— con $\text{R} = \text{CONH}_2, \text{CHO}, \text{COOR}_1, \text{COOX}, \text{CN}$
————— con $\text{R}_1 = \text{CH}_3, \text{C}_2\text{H}_5$
————— where X may be hydrogen or a suitable cation such as alkali metal or ammonium.

With the premise that at least one of substituent R always is different from $\text{CH}_2\text{PO}_3\text{M}_2$.

A scale inhibitor comprising at least one polymethylenephosphate derivative having the following formula:



wherein n is a number,

wherein M is a hydrogen or a cation,

wherein R₁, R₂, and R₃ are each independently selected from the group consisting of,

CH₂PO₃M₂,

CH₂R₄, wherein R₄ is CHOHCH₃, CHOHCH₂Cl, or CHOHCH₂OH,

(CH₂)_mSO₃M, wherein m is 3 or 4, and

CH₂CH₂R₅, wherein R₅ is CONH₂, CHO, COOR₆, COOX, or CN, wherein R₆ is CH₃ or C₂H₅, and wherein X is an alkali metal or ammonium, and

wherein at least one of R₁, R₂, and R₃ is not CH₂PO₃M₂.

Claim 3 (currently amended) ~~Polyaminomethylenephosphonate derivatives~~ The scale inhibitor according to claim 2, wherein ~~also~~ at least one of the terminal CH₂PO₃H₂ moieties substituted by one of the moieties under the above points 1 to 4 CH₂PO₃M₂ moieties in a terminal position on the molecule is replaced by a moiety selected from the group consisting of CH₂R₄, (CH₂)_mSO₃M, and CH₂CH₂R₅.

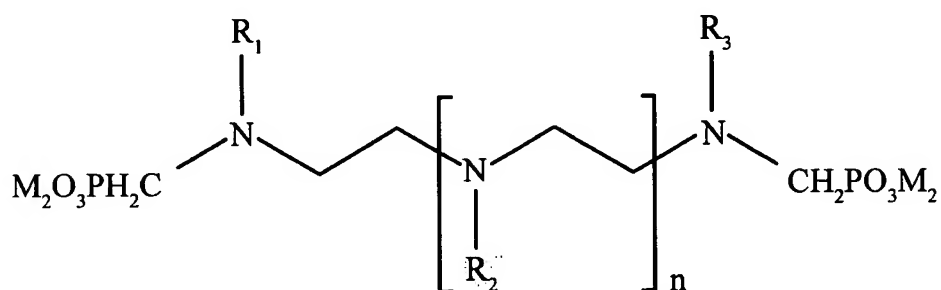
Claim 4 (currently amended) ~~Process for the preparation of the polyaminomethylenephosphonate derivative according to claims 1 or 2, comprising~~ The scale inhibitor of claim 2, wherein the polyaminomethylenephosphonate derivative is produced by a process of phosphonomethylation of polyamine derivatives by means of employing the Mannich reaction.

Claim 5 - 7 (canceled)

Claim 8 (new): The precipitation inhibitor according to claim 2, wherein n is a number in the range 2 to 15,000.

Claim 9 (new): The precipitation inhibitor according to claim 2, wherein the cation is an alkali metal or ammonium.

Claim 10 (new): A method for inhibiting scale formation in water, the method comprising the step of adding to the water a scale inhibitor comprising at least one polymethylenephosphonate derivative having the following formula:



wherein n is a number,

wherein M is hydrogen or a cation,

wherein R₁, R₂, and R₃ are each independently selected from the group consisting of,

CH₂PO₃M₂,

CH₂R₄, wherein R₄ is CHOHCH₃, CHOHCH₂Cl, or CHOHCH₂OH,

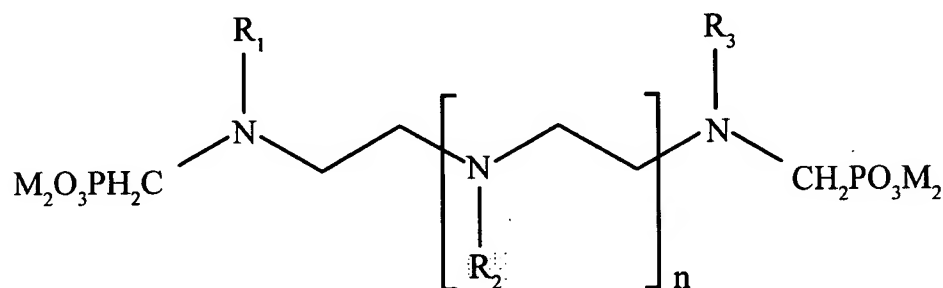
(CH₂)_mSO₃M, wherein m is 3 or 4, and

CH₂CH₂R₅, wherein R₅ is CONH₂, CHO, COOR₆, COOX, or CN, wherein R₆ is CH₃ or C₂H₅, and wherein X is an alkali metal or ammonium, and

wherein at least one of R₁, R₂, and R₃ is not CH₂PO₃M₂.

Claim 11 (new): The method according to claim 10, further comprising the step of precipitating the polymethylenephosphonate derivative on a metal surface in contact with the water, thereby preventing corrosion of the metal surface.

Claim 12 (new): A method for sequestering iron ions in a water system, the method comprising the step of providing the water in the water system with a scale inhibitor comprising at least one polymethylenephosphonate derivative having the following formula:



wherein n is a number,

wherein M is hydrogen or a cation,

wherein R₁, R₂, and R₃ are each independently selected from the group consisting of,

CH₂PO₃M₂,

CH₂R₄, wherein R₄ is CHOHCH₃, CHOHCH₂Cl, or CHOHCH₂OH,

(CH₂)_mSO₃M, wherein m is 3 or 4, and

CH₂CH₂R₅, wherein R₅ is CONH₂, CHO, COOR₆, COOX, or CN, wherein R₆ is CH₃ or C₂H₅, and wherein X is an alkali metal or ammonium, and

wherein at least one of R₁, R₂, and R₃ is not CH₂PO₃M₂.